

What is claimed is:

1. A reductase comprising

i)an amino acid sequence of SEQ ID NO:1 having
a substitution at amino acid position 245 or 271 or
5 at both of the amino acid positions 245 and 271, or

ii)an amino acid sequence as defined in i)
having further substitution, deletion, or
addition of an amino acid or acids;

2. A reductase according to claim 1, which comprises
10 an amino acid sequence of SEQ ID NO:1 having a
substitution at amino acid position 245 or 271 or at
both of the amino acid positions 245 and 271;

3. A reductase according to claim 1 or 2, wherein

said substitution is a single amino acid substitution at
15 amino acid position 245 in the amino acid sequence of SEQ
ID NO:1.

4. A reductase according to claim 1 or 2, wherein

said substitution is a single amino acid substitution at
amino acid position 271 in the amino acid sequence of SEQ
20 ID NO:1.

5. A reductase according to claim 1 or 2, wherein

the amino acids at positions 245 and 271 of the amino acid
sequence of SEQ ID NO:1 are substituted a same amino acid
or different amino acids.

6. A reductase according to claim 3 or 5, wherein

the amino acid at amino acid position 245 is substituted
with arginine.

7. A reductase according to claim 4 or 5, wherein

the amino acid at amino acid position 271 is substituted

with aspartic acid.

8. A reductase according to claim 1, wherein
the amino acid at amino acid position 245 of the
amino acid sequence of SEQ ID NO:1 is substituted with
5 arginine, and the amino acid at amino acid position 271 of
the amino acid sequence of SEQ ID NO:1 is substituted with
aspartic acid.

9. A polynucleotide sequence comprising a
polynucleotide sequence encoding an amino acid sequence of
10 the reductase of claim 1 or 2.

10. A vector comprising the polynucleotide of claim
9.

11. A transformant comprising the polynucleotide
sequence of claim 9 or the vector of claim 10.

15 12. A vector according to claim 10, which further
comprises a polynucleotide sequence encoding an amino acid
sequence of a protein capable of converting an NADP or an
NAD into NADPH or NADH respectively.

13. A transformant of claim 11, which further
20 comprises a polynucleotide sequence encoding the amino acid
sequence of a protein capable of converting an NADP or NAD
into NADPH or NADH respectively.

14. A method for producing (S)-halo-3-
hydroxybutyrate ester, which comprises reacting 4-halo-3-
25 oxobutyrate ester with the transformant of claim 11 or
claim 13 or a treated material thereof.

15. A method for modifying an enzyme, which
comprises substituting at least one of the amino acids at
positions 245 and 271 of the amino acid sequence of SEQ ID

NO:1 respectively with another amino acid(s), thereby heat stability of said enzyme in the reduction reaction is improved.

16. A method for producing a modified enzyme gene,
5 which comprises replacing at least one codon corresponding to the amino acids at positions 245 and 271 of the amino acid sequence of SEQ ID NO:1, with another codon or codons corresponding to an amino acid(s), in a nucleotide sequence encoding the amino acid sequence of SEQ ID NO:1.

10